

QUANTIFICATION OF UV STIMULATED ICE CHEMISTRY: CO AND CO₂

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It has been shown by several investigations in the past that the ice surfaces expected for Oort comets can be processed by various forms of radiation and that new chemical species are formed by the process. The radiation seems to cause the formation of radicals within the ice and then these radicals react with the species present at the boundary of their interstitial sites. Such chemistry within the ice can conceivably produce complex organic compounds by a series of reactions. The continuous radiation of the interstellar molecular clouds has been shown to result in measurable concentrations of complex molecular species by a series of ion-molecule reactions. It seems time to look at the individual reactions that do occur in pure ices and binary mixtures of ices in order to quantify the reactions that occur in icy bodies.

Recent laboratory experiments are presented that show that during photolysis of the pure ices there is evidence of the interconversion of CO to CO₂ and CO₂ to CO using Lyman alpha (1216Å) radiation. In addition, there is a substantial amount of another substance being produced. This substance is evident by its infrared absorption peak at 2235 cm⁻¹. It is believed that this new peak is due to carbon suboxide, C₃O₂. CO and CO₂ have already been detected in comets, and C₃O₂ has been suggested as a cometary from radiation of CO [Delitsky and Huntress, *BAAS* 20, (1988)]. Comparisons are made between our results at 1215Å and proton radiation experiments and radiation at other wavelengths. The suggestion is that the processing of ices is energy dependent, i.e. dependent on the type of radiation. Several difficult problems have to be solved before these radiation conversion can be quantified. The steps that we are taking to quantify the kinetics are discussed.